- ✓ **Applicant:** Salton Sea Authority/Tetra Tech
- ✓ **Project Title**: Selenium Bioaccumulation and Ecological Risk Assessment at Four Wetlands near the Salton Sea
- ✓ **County:** Imperial
- ✓ **Grant Request:** $403,746
- ✓ **Total Project Cost: $403,746**

Project Description: RESEARCH: A study of three constructed flow-through wetlands (Brawley, Imperial, Shank Road) fed by the New and Alamo Rivers will be conducted to determine whether adding wetlands to the watersheds is beneficial. The applicant also has a contingency plan to include a wetland at Holtville if construction is completed. The proposal components are a selenium (Se) data review; field sampling of water, sediment, algae/plant, invertebrate, amphibian/tadpole, and fish for Se analysis during spring; a reconnaissance-level biological inventory of plants and animals; water quality Se modeling of input, output, and losses; Se bioaccumulation modeling; and a regional population level Se risk assessment. This information is considered important to support decision-making for expansion of wetlands along the New and Alamo Rivers.

Summary

Criteria	Score	Factor	Total
1. Consistency with Program goals and objectives	0	7	0
2. Applicant qualifications	3	3	9
3. Project Readiness	3	3	9
4. Feasibility	0	7	0
		Total Score	**18**

Consistency with Program goals and objectives:

The described study does not address the Program goals and objectives. Specifically, 1) the project components do not align with recent advances in the environmental science of Se; and 2) the proposed data compilation, field studies, and data synthesis are insufficient to support conclusions concerning Se transfer through food webs, avian risk through Se ecotoxicity, and management of constructed wetlands. Serious weaknesses include lack of 1) documentation for the approaches to assessing, quantifying, and modeling Se speciation, transformation/partitioning between dissolved and particulate phases, bioaccumulation, and risk; 2) a direct measure of avian risk and the effects associated with the exposure; 3) detailed conceptual models for a Se mass balance and exposure; 4) adequate scope and intensity of sample collection; and 5) specifics on integration of results from previous work on wetlands near the Salton Sea. The population-level focus proposed for the risk assessments is inappropriate. All of the species of birds likely to be attracted to the water treatment wetlands are protected by the Migratory Bird Treaty Act, which warrants conducting risk assessments at the level of individual risk. Further, reference was not made to a regional level inventory or a pre-existing regional level database on which to measure the demographic status of focal species. Selenium ecotoxicology references cited in the proposal are about a decade behind where they should be with regard to Se risk assessment in general and for birds in particular.

Applicant qualifications:

The applicant team has experience and knowledge of the wetlands near the Salton Sea and has affiliations with local groups. However, team members lack expertise in Se environmental science and risk assessment, a serious deficiency given the nature of the work proposed. The risk assessment team appears to have worked primarily on plants, arthropods, and mammals, not birds. More diversity in expertise is desirable, especially in terms of integrated biodynamic Se modeling, food chain physiology, and avian exposure.

Project Readiness:

Most of the project will be able to start within 12 months after the agreement execution date. Two of the four wetlands included in the study have been monitored previously, but it is unclear if historical data exist for the Shank Road wetland. Construction has not begun on the Holtville wetland and funding is not currently available to begin that construction. The task of compiling and organizing historical data can begin immediately. Delayed funding of the proposal may rule out the Mar/Apr sampling in year 1. The working relationships necessary for on-the-ground logistics seem already to be in place because most of the work is a continuation of existing studies on the New and Alamo River that were led by Tetra Tech. However, the suitability of the work plan is in question, with additional work needed to present an integrated basis for the approach, update the methodologies, and expand field sampling to ensure the proposed study meets the goals of the Program.

Feasibility:

The applicant has not demonstrated the feasibility of some of the major components of this proposal. Feasibility is limited by the amount of historical data available; the magnitude and complexity of the proposed field sampling; and the methodologies for a water budget, a Se mass balance, the modeling and prediction of Se transfer in food webs, and a risk assessment.

For example, absent from the proposal are 1) equations or figures depicting the basis, components, and calculations for the proposed Se mass balance and food web transfer modeling; 2) references specific to Se bioaccumulation modeling; and 3) depiction of sampling sites and the statistical power of the sampling scheme at the scale of each wetland project. Further, referenced historical work and water budget methodologies were not made available to the review panel (Tetra Tech, 2006). Sampling methods for media compartments are not discussed or referenced. This is especially problematic in terms of representation of food for invertebrates, a key component of updated bioaccumulation models. The base of the food web, as sampled in the environment, can include phytoplankton, periphyton, detritus, inorganic suspended material, biofilm, sediment and/or attached vascular plants. Task 4 is to model “rates” of Se uptake through food webs, yet this would be very crude, if even possible, based on only one biological sampling event per year (see schedule). It is unlikely that there is a broad enough range in contaminant conditions at the four wetlands for

the planned regression modeling to produce regressions statistically powerful enough for the planned predictive purposes. The focus for assessing avian risk at the level of "regional population impacts" will not be feasible based on the data collection protocols, scope, and frequencies put forth in the proposal. In order for the risk assessment component of this proposal to be feasible, it must directly measure avian exposure to Se, and preferably, also the effects (or lack) associated with the exposure. This would require a much higher field sampling intensity than is being proposed and a primary focus on avian tissue sampling, with secondary focus on lower trophic level food web sampling. Ideally, it would also include an avian reproductive performance assessment via intensive nest monitoring, egg sampling, and embryo assessment protocol. The proposed reliance on NOAELs and LOAELs as a basis for deriving TRVs runs counter to current scientific consensus.

Overall, data and methodologies are insufficient to support the modeling and extensive risk assessment as planned (see budget), thus affecting the quality of the deliverables. Further, uncertainty may not be able to be narrowed to such a degree as to help planning and management efforts by decision makers. The Program may be better served by an extensive data collection effort and formalized database to enable calculation of food web transfer as the foundation for future modeling, prediction, and risk assessment.

FUNDING RECOMMENDATION: $0

Per the Financial Assistance Program PSP 2012, if a "0" score is received for any of the four evaluation criteria, the applicant, and therefore the proposal, will be disqualified. This proposal received two "0" scores in the Consensus Review.